

REMARKS

Claims 10-18 are all the claims pending in the application. Claims 10-12 are rejected. Claims 13-18 are objected to but would be allowable if placed into independent form. Applicants have amended claims 10 and 13, the latter to place the claim into independent form and secure the allowability of claims 13-18.

Claim Rejections – 35 USC 103(a)

Claims 10 and 12 are rejected under 35 USC 103(a) as being unpatentable over Maekawa et al (6,570,160) in view of Sekine et al (6,844,570). This rejection is traversed for at least the following reasons.

The radiation detector according to the present invention detects how first radiation and second radiation are spatially distributed, and includes a plurality of optical transducers, each of which converts (1) the first incident radiation to light having a first wavelength, and (2) the second radiation to light having a second wavelength. As illustrated in Figs. 5 and 6 for the first exemplary embodiment, the same structure for a single transducer can detect an X-ray or a γ -ray, respectively. A plurality of first photoelectric converters are arranged along the optical transducers in a one-to-one correspondence and output electrical signals according to the intensity of the light having the first wavelength. A plurality of second photoelectric converters, which are arranged along the optical transducers in a one-to-one correspondence, output electrical signals according to the intensity of the light having the second wavelength. In short, the radiation detector according to the present invention includes a plurality of **optical transducers**, each of which receive the first radiation **and** the second radiation to perform optical **conversion on both of them**. Therefore, occurrence of misalignment in different radiations can be prevented upon detection of their spatial distributions.

The recitation of the invention in claim 10 is somewhat broader than that of the exemplary embodiments in Figs. 1-6, 7-8 and 9 in that it appears to encompass a structure with separate transducers for each of the first and second radiation types. Applicants have modified claim 10, with reference to the first exemplary embodiment, but without limitation thereto, that would read as follows and should clearly distinguish over the cited prior art:

Maekawa et al

The Examiner cites the patent to Maekawa et al because it teaches in Fig. 1 a radiation detector (11) that is responsive to two types of radiation, both α -ray and β -ray, and uses separate scintillators (14, 15) to convert the first radiation to a first light having a first wavelength and to convert second radiation to a second light having a second wavelength (col. 4, lines 29-39). The Examiner identifies correspondence to photo-detectors (17). The Examiner admits that Maekawa et al fails to show an array of optical transducers that are separated by a shielding unit. This feature is absent because Maekawa et al is concerned with only a single module that has separate detectors for different types of radiation.

Clearly, none of the illustrations of the detector and none of the description of the detector teach or suggest a single transducer for both types of radiation, as now claimed, or an array of such transducers that are separated by shielding. The Examiner looks to Sekine et al to remedy the deficiencies in Maekawa et al.

Sekine et al

The Sekine et al reference is cited to show a collimator unit (14) that is fit between scintillators 11 for shielding purposes. Sekine et al also concerns a radiation detector, and concerns a scintillator array (59) that has photodiodes (55) for detecting X-rays (Fig. 19).

First, Applicants note that Sekine et al also teaches the use of separators (60) between X-ray sensitive scintillators (59) in Fig. 19. However, there is no teaching or suggestion of a common scintillator for two types of radiation.

Second, Applicants note that Sekine et al does not teach a structure for detecting a second type of radiation. Accordingly, Applicants respectfully submit that a fundamental feature of the invention is not taught in Sekine et al either.

Thus, since neither reference teaches this basic claimed structure, the combination of Maekawa et al and Sekine et al cannot render the presently claimed invention obvious. Moreover, there is no teaching or suggestion as to how the stand-alone structure of Maekawa et

al could be adapted to be placed into an array of the type taught in Sekine et al, such that two types of radiation could be efficiently detected.

Based on the foregoing amendment and argument, the claims clearly are patentable.

Claim 11 is rejected under 35 USC 103(a) as being unpatentable over Maekawa et al (6,570,160) in view of Sekine et al (6,844,570) and further in view of Takami et al (4,090,081). This rejection is traversed for at least the following reasons.

The basic deficiencies in Maekawa et al and Sekine et al, whether taken alone or in combination, have been identified. Takami et al does not remedy this deficiency, as it is cited for the use of a scintillator (crystals 5 and 6) and associated photomultipliers (PM_{i-3} to PM_{i+1}) for detecting gamma rays. The Examiner does not assert that this structure can detect both X-rays and γ -rays. Moreover, there is no teaching of an array of detectors. Applicants respectfully submit that there is no teaching or suggestion for applying the gamma ray detection structure of Takami et al to the array of Sekine et al or even the stand-alone structure of Maekawa et al to detect two types of radiation in a single scintillator structure.

Allowable Subject Matter

The Examiner has indicated that dependent claims 13-18 are patentable, if placed into independent form. Applicants have placed claim 13 into independent form by incorporating the original limitations of claim 1 into claim 13. Thus, independent claim 13 and dependent claims 14-18 would be patentable.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Amendment under 37 C.F.R. § 1.111
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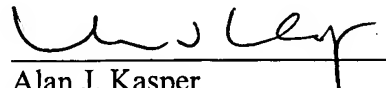
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